

## **SECTION 04901**

### **CLAY MASONRY RESTORATION AND CLEANING**

#### **PART 1 - GENERAL**

##### **0.1 DESCRIPTION OF WORK**

- A.** Work Included: This Section specifies restoration and cleaning of brick as follows:
1. Repairing clay masonry, including replacing damaged units.
  2. Reanchoring veneers.
  3. Repointing mortar joints.
  4. Removing plant growth.
  5. Cleaning exposed clay masonry surfaces.
- B.** Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 04800 - MASONRY; new clay masonry construction.
  2. Section 07620 - SHEET METAL FLASHING AND TRIM; metal flashing installed in or on restored clay masonry.
  3. Section 07920 - JOINT SEALANTS; sealing joints in restored clay masonry.
- C.** Unit Prices: Unit prices for clay masonry restoration and cleaning are specified in Division 1 Section "Unit Prices".
1. Unit prices apply to authorized work covered by quantity allowances.
  2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

##### **0.2 DEFINITIONS**

- A.** Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- B.** Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

##### **0.3 SUBMITTALS**

- A.** Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- B.** Shop Drawings: Full-size patterns for specially molded brick shapes.

- C. Samples for Verification:** Before erecting mockup, submit samples of the following:
1. Each type of exposed masonry unit to be used for replacing existing units.
    - a. For each brick type, provide straps or panels containing at least four bricks.
  2. Each type of sand used for pointing mortar.
    - a. For blended sands, provide samples of each component and blend.
    - b. Identify sources, both supplier and quarry, of each type of sand.
- D. Qualification Data:** For restoration specialists including field supervisors.
- E. Restoration Program:** For each phase of restoration process, provide detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials on building and Project site.
1. Include methods for keeping pointing mortar damp during curing period.
  2. If materials and methods other than those indicated are proposed for any phase of restoration work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.
- F. Cleaning Program:** Describe cleaning process in detail, including materials, methods, and equipment to be used and protection of surrounding materials on building and Project site, and control of runoff during operations. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

#### **0.4 QUALITY ASSURANCE**

- A. Restoration Specialist Qualifications:** Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
  2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning are in progress. Supervisors

shall not be changed during Project except for causes beyond the control of restoration specialist firm.

3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- B.** Chemical Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- C.** Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.
- D.** Preconstruction Testing Service: Contractor shall engage a qualified independent testing agency to test the following. Provide test specimens and assemblies as indicated.
  1. Replacement Brick: For each proposed type of replacement brick, according to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).
  2. Existing Brick: For each type of existing brick indicated for replacement, according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove existing bricks from locations designated by Engineer.
- E.** Mockups: Prepare mockups of restoration and cleaning as follows to demonstrate aesthetic effects and qualities of materials and execution. Prepare mockups on existing walls under same weather conditions to be expected during remainder of the Work.
  1. Repair an area approximately 36 inches high by 48 inches wide for each type of masonry material indicated to be rebuilt or replaced.
  2. Patch three small areas at least 1 inch in diameter for each type of masonry material indicated to be patched.
  3. Clean an area approximately 25 sq. ft. in area for each type of clay masonry and surface condition.
    - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions unless cleaners and methods are known to have deleterious effect.
    - b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.

4. Rake out joints in two separate areas approximately 36 inches high by 72 inches wide for each type of repointing required and repoint one of the two areas.

## **0.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store lime putty covered with water in sealed containers.
- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

## **0.6 PROJECT CONDITIONS**

- A. Repoint mortar joints and repair masonry only when air temperature is between and 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of work.
- B. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing:
  1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
  2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and pointing.
- C. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F and above.
- D. Patch masonry only when air and surface temperatures are between and 55 and 100 deg F and are predicted to remain above 55 deg F for at least 7

days after completion of work. On days when air temperature is predicted to go above 90 deg F, schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.

- E. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

## **0.7 SEQUENCING AND SCHEDULING**

- A. Order replacement materials at earliest possible date, to avoid delaying completion of the Work.
- B. Perform masonry restoration work in the following sequence:
  - 1. Remove plant growth.
  - 2. Repair existing masonry, including replacing existing masonry with new masonry materials.
  - 3. Rake out joints that are to be repointed.
  - 4. Point mortar joints.
  - 5. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
  - 6. Remove paint.
  - 7. Clean masonry surfaces.
  - 8. Rake out joints that are to be repointed.
  - 9. Point mortar joints.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with Part 3 "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with Part 3 "Repointing Masonry" Article.

## **PART 2 - PRODUCTS**

### **0.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

## **0.2 MASONRY MATERIALS**

- A.** Face Brick and Accessories: Provide face brick and accessories, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work. Provide units with colors, surface texture, size, and shape to match existing brickwork and with physical properties not less than those determined from preconstruction testing of selected existing units. For existing brickwork that exhibits a range of colors, provide brick that matches that range rather than brick that matches an individual color within that range.
- B.** Building Brick: Provide building brick complying with ASTM C 62, of same vertical dimension as face brick, for masonry work concealed from view. Provide Grade SW where in contact with earth.

## **0.3 MORTAR MATERIALS**

- A.** Portland Cement: ASTM C 150, Type I or Type II. Provide white cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B.** Hydrated Lime: ASTM C 207, Type S.
- C.** Mortar Sand: ASTM C 144, unless otherwise indicated.
  - 1. Color: Provide natural sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
  - 2. For pointing mortar, provide sand with rounded edges.
  - 3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands, if necessary, to achieve suitable match.
- D.** Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- E.** Water: Potable.

## **0.4 PAINT REMOVERS**

- A.** Low-Odor, Solvent-Type Paint Remover: Manufacturer's standard low-odor, water-rinsable solvent-type gel formulation, containing no methanol or methylene chloride, for removing paint coatings from masonry.
  - 1. Available Products:
    - a. American Building Restoration Products, Inc.; Super Bio Strip Gel.
    - b. Dumond Chemicals, Inc.; Peel Away 6.

- c. ProSoCo; Enviro Klean NMC.

## **0.5 CLEANING MATERIALS**

- A.** Water for Cleaning: Potable.
- B.** Hot Water: Heat water to a temperature of 140 to 160 deg F.
- C.** Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D.** Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups of tetrasodium polyphosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.
- E.** Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents and chelating agents and is specifically formulated for cleaning masonry surfaces.
  - 1. Available Products:
    - a. Price Research, Ltd.; Price Marble Cleaner-Gel.
    - b. ProSoCo; Sure Klean 942 Masonry Cleaner.
- F.** Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
  - 1. Available Products:
    - a. Dominion Restoration, Inc.; Bio-Cleanse.
    - b. Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.
    - c. ProSoCo; Enviro Klean Restoration Cleaner.

## **0.6 MISCELLANEOUS MATERIALS**

- A.** Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry, is vapor and water permeable, exhibits low shrinkage, and develops high bond strength to all types of masonry.
  - 1. Formulate patching compound used for patching brick in colors and textures to match brick being patched. Provide number of colors needed to enable matching each brick.

2. Formulate patching compound used for patching unglazed terra cotta in colors and textures to match terra cotta being patched.
  3. Available Products:
    - a. Cathedral Stone Products, Inc.; Jahn Restoration Mortar.
    - b. Edison Coatings, Inc.; Custom System 45.
- B. Liquid Strippable Masking Agent:** Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
1. Available Products:
    - a. American Building Restoration Products, Inc.; LM 130 Acid Shield.
    - b. Diedrich Technologies Inc.; Diedrich Acid Guard.
    - c. ProSoCo; Sure Klean Strippable Masking.
- C. Masonry Repair Anchors, Expansion Type:** Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch-diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.

## **0.7 MORTAR MIXES**

- A. Measurement and Mixing:** Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
1. **Mixing Pointing Mortar:** Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar:** Produce mortar of color required by using selected ingredients. Do not alter specified proportions without Engineer's approval.
1. **Mortar Pigments:** Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C.** Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar Proportions:** Mix mortar materials in the following proportions:



1. Pointing Mortar for Brick: 1 part Portland cement, 2 parts lime, and 6 parts sand.
  - a. Add mortar pigments to produce mortar colors required.
2. Rebuilding (Setting) Mortar: Same as pointing mortar.
3. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated; with cementitious material content limited to Portland cement and lime.

## **0.8 CHEMICAL CLEANING SOLUTIONS**

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical cleaner manufacturer.

## **PART 3 - EXECUTION**

### **0.1 PROTECTION**

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
  1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
  2. Keep wall wet below area being cleaned to prevent streaking from runoff.
  3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
  4. Neutralize and collect alkaline and acid wastes for disposal off Authority's property.
  5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and

foundations, damage to landscaping, and water penetration into building interiors.

- C.** Prevent mortar from staining face of surrounding masonry and other surfaces.
  - 1. Cover sills, ledges, and projections to protect from mortar droppings.
  - 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
  - 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
  - 4. Clean mortar splatters from scaffolding at end of each day.
- D.** Remove gutters and downspouts adjacent to masonry and store where indicated during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning is complete.
  - 1. Provide temporary rain drainage during work as indicated to direct water away from building.

## **0.2 UNUSED ANCHOR REMOVAL**

- A.** Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
  - 1. Remove items carefully to avoid spalling or cracking masonry.
  - 2. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.
  - 3. Patch holes where items were removed unless directed to remove and replace units.

## **0.3 BRICK REMOVAL AND REPLACEMENT**

- A.** At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units. When removing single bricks, remove material from center of brick and work toward outside edges.
- B.** Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C.** Notify Engineer of unforeseen detrimental conditions including voids, cracks, bulges, and loose masonry units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

- D.** Remove in an undamaged condition as many whole bricks as possible.
  - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
  - 2. Store brick for reuse, as indicated.
  - 3. Deliver cleaned brick not required for reuse to Authority, unless otherwise directed.
- E.** Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F.** Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- G.** Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid. Maintain joint width for replacement units to match existing joints.
  - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
  - 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.

#### **0.4 REANCHORING VENEERS**

- A.** Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches o.c. vertically and 32 inches o.c. horizontally, unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B.** Recess anchors at least 5/8 inch from surface of mortar joint and fill recess with pointing mortar.

#### **0.5 MASONRY UNIT PATCHING**

- A.** Patch the following masonry units: Units indicated to be patched and units with holes, units with chipped edges or corners, units with small areas of deep deterioration.
- B.** Remove and replace existing patches, unless otherwise indicated or approved by Engineer.

**C. Patching Bricks:**

1. Remove loose material from brick surface. Remove additional material so patch will not have feathered edges and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
2. Mask or remove surrounding mortar joints if patch will extend to edge of brick.
3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
4. Rinse surface to be patched and leave damp, but without standing water.
5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
7. Trowel, scrape, or carve surface of patch to match texture and surface plane of surrounding brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.
8. Keep each layer damp for 72 hours or until patching compound has set.

**0.6 CLEANING MASONRY, GENERAL**

- A.** Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- B.** Use only those cleaning methods indicated for each masonry material and location.
1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
  2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry. Equip units with pressure gages.
  3. For chemical cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
  4. For water spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
  5. For heated water spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

6. For steam application, use steam generator capable of delivering live steam at nozzle.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. Removing Plant Growth: Completely remove plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
- E. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
  1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
  2. Remove paint and calking with alkaline paint remover.
    - a. Comply with requirements for paint removal.
    - b. Repeat application up to two times if needed.
  3. Remove asphalt and tar with solvent-type paint remover.
    - a. Apply only to asphalt and tar by brush without prewetting.
    - b. Allow paint remover to remain on surface for 10 to 30 minutes.
    - c. Rinse off with water using low-pressure spray.
    - d. Repeat application if needed.
- F. Water Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- G. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding 80 psi. Hold nozzle at least 6 inches from surface of masonry and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- H. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical cleaner manufacturer's written instructions; use brush or spray application methods, at Contractor's option. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- I. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during

each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed. Apply neutralizing agent and repeat rinse, if necessary, to produce tested pH of between 6.7 and 7.5.

- J.** After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

## **0.7 PAINT REMOVAL**

**A.** Paint Removal with Alkaline Paste Paint Remover:

1. Apply paint remover to dry, painted masonry with brushes.
2. Allow paint remover to remain on surface for period recommended by manufacturer.
3. Rinse with hot water applied by medium-pressure spray to remove chemicals and paint residue.
4. Repeat process, if necessary, to remove all paint.
5. Apply acidic cleaner to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer.
6. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.

**B.** Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:

1. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
2. Apply cover, if required by manufacturer, per manufacturer's written instructions.
3. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
4. Scrape off paint and remover and collect for disposal.
5. Rinse with hot water applied by medium-pressure spray to remove chemicals and paint residue.
6. Use alkaline paste paint remover according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph, if necessary, to remove remaining paint.
7. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.

**C.** Paint Removal with Solvent-Type Paint Remover:

1. Apply thick coating of paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
2. Allow paint remover to remain on surface for period recommended by manufacturer. Agitate periodically with stiff-fiber brush.
3. Rinse with cold water applied by medium-pressure spray to remove chemicals and paint residue.

## **0.8 CLEANING BRICKWORK**

- A.** Cold-Water Wash: Use cold water applied by medium-pressure spray.
- B.** Steam Cleaning: Apply steam at pressures not exceeding 80 psi.
- C.** Detergent Cleaning:
  - 1. Wet masonry with water applied by low-pressure spray.
  - 2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
  - 3. Rinse with water applied by medium-pressure spray to remove detergent solution and soil.
  - 4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
- D.** Mold, Mildew, and Algae Removal:
  - 1. Wet masonry with water applied by low-pressure spray.
  - 2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
  - 3. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.
  - 4. Rinse with water applied by medium-pressure spray to remove mold, mildew, and algae remover and soil.
  - 5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
- E.** Nonacidic Gel Chemical Cleaning:
  - 1. Wet masonry with water applied by low-pressure spray.
  - 2. Apply nonacidic gel cleaner in 1/8-inch thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.
  - 3. Let cleaner remain on surface for period as established by mockup.
    - a. As recommended by chemical cleaner manufacturer.
  - 4. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
  - 5. Rinse with water applied by medium-pressure spray to remove chemicals and soil.

6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

**F. Nonacidic Liquid Chemical Cleaning:**

1. Wet masonry with water applied by low-pressure spray.
2. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period as established by mockup.
3. Rinse with water applied by medium-pressure spray to remove chemicals and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

## **0.9 REPOINTING MASONRY**

**A. Rake out and repoint mortar joints to the following extent:**

1. All joints in areas indicated and as follows.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
4. Cracked joints where cracks are 1/8 inch or more in width and of any depth.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back 1/4 inch or more from surface.
7. Joints where they are deteriorated to point that mortar can be easily removed by hand.
8. Joints, other than those indicated as sealant-filled joints, where they have been filled with substances other than mortar.

**B. Do not rake out and repoint joints where not required.**

**C. Rake out joints as follows:**

1. Remove mortar from joints to depth of joint width plus 1/8 inch, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Engineer.
  - a. Cut out mortar by hand with chisel and mallet. Do not use power-operated grinders without Engineer's written approval based on submission by Contractor of a satisfactory quality-



control program and demonstrated ability of operators to use tools without damaging masonry. Quality-control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

**D.** Notify Engineer of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

**E.** Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.

**F.** Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.

1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
2. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

**G.** Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

## **0.10 FINAL CLEANING**

**A.** After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.

1. Do not use metal scrapers or brushes.

2. Do not use acidic or alkaline cleaners.

- B.** Wash adjacent woodwork and other nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C.** Clean masonry debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D.** Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.

#### **0.11 FIELD QUALITY CONTROL**

- A.** Inspectors: Contractor shall engage qualified independent inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B.** Engineer will observe progress and quality of portion of the Work completed. Allow Engineer use of scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- C.** Notify Engineer in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Engineer has reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

### **PART 4 - MEASUREMENT AND PAYMENT**

#### **0.1 MEASUREMENT**

- A.** Masonry restoration and masonry cleaning will be measured per square foot complete in place, including all accessories and incidentals.

#### **0.2 PAYMENT**

- A.** Payment for masonry restoration and masonry cleaning will be made at the Contract unit price for the measurement as specified above.

#### **0.3 PAYMENT ITEMS**

ITEM NO.	DESCRIPTION	UNIT
0450.100	MASONRY RESTORATION	SF

0450.105 MASONRY CLEANING

SF

**END OF SECTION**

## **NOTES TO THE DESIGNER**

**A.** Any request to modify or waive the specification requirements listed below must be approved in writing by the MBTA's Director of Design:

1. None.